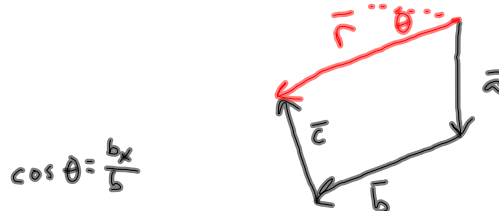
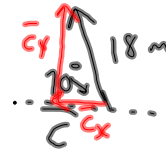
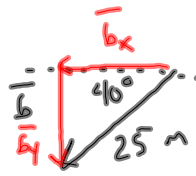
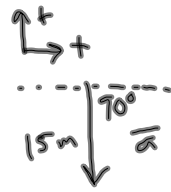


Displacement Notes and Vector Practice 1.23.12 Honors Physics

Add graphically and algebraically:



$$a_x = 0$$

$$b_x = -(25 \text{ m}) \cos(40^\circ) = -19.15 \text{ m}$$

$$+ c_x = -(18 \text{ m}) \cos(70^\circ) = -6.16 \text{ m}$$

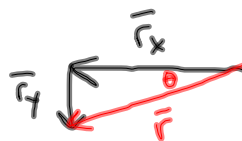
$$r_x = -25.31 \text{ m}$$

$$a_y = -15 \text{ m}$$

$$b_y = -(25 \text{ m}) \sin(40^\circ) = -16.07 \text{ m}$$

$$+ c_y = + (18 \text{ m}) \sin(70^\circ) = 16.91 \text{ m}$$

$$r_y = -14.16 \text{ m}$$



$$r^2 = r_x^2 + r_y^2$$

$$r = 29.1 \text{ m}$$

$$\tan \theta = \frac{r_y}{r_x}$$

$$\theta = \tan^{-1}\left(\frac{r_y}{r_x}\right)$$

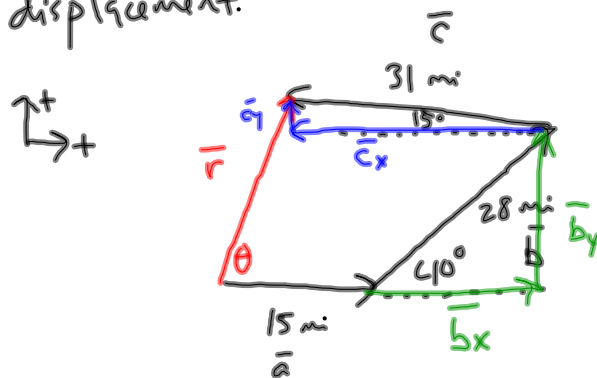
$$= 29.2^\circ$$

$$\vec{r} = 29.1 \text{ m} @ 29.2^\circ \text{ S of W}$$

Quiz Wednesday

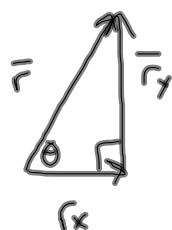
Redo HW for top section

A car travels 15 miles east, turns and drives 28 miles at 40° North of east, and finally turns and goes 31 miles at 15° North of west. Find the resultant displacement.



$$\begin{aligned}
 a_x &= 15 \text{ mi} \\
 b_x &= (28 \text{ mi}) \cos(40^\circ) = 21.45 \text{ mi} \\
 + c_x &= -(31 \text{ mi}) \cos(15^\circ) = -29.94 \text{ mi} \\
 \hline
 r_x &= 6.51 \text{ mi}
 \end{aligned}$$

$$\begin{aligned}
 a_y &= 0 \\
 b_y &= (28 \text{ mi}) \sin(40^\circ) = 18.00 \text{ mi} \\
 + c_y &= (31 \text{ mi}) \sin(15^\circ) = 8.02 \text{ mi} \\
 \hline
 r_y &= 26.02 \text{ mi}
 \end{aligned}$$



$$r^2 = r_x^2 + r_y^2$$

$$r = 26.82 \text{ mi}$$

$$\tan \theta = \frac{r_y}{r_x}$$

$$\theta = \tan^{-1}\left(\frac{r_y}{r_x}\right) = 75.95^\circ$$

$$\vec{r} = 26.82 \text{ mi} @ 75.95^\circ \text{ N of E}$$

Displacement v. Distance:

- Definitions:

- Displacement: change in position
difference between where you started
and where you finish

- * vector

- Distance: total amount traveled
to get from starting point to
ending point

- * scalar

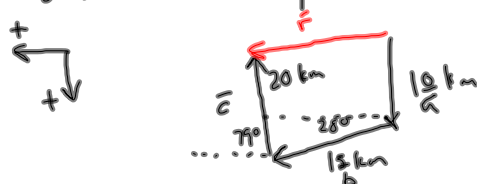
- calculate by adding the magnitudes of all
displacement vectors

- Similarities:

- both are in m^x as base unit
 - both deal with how far something
went

Displacement Notes and Vector Practice 1.23.12 Honors Physics

A bird flies 10 km south, then 15 km at 28° South of West, then 20 km at 79° North of West. Find the bird's distance and displacement.



$$\text{distance} = 10 \text{ km} + 15 \text{ km} + 20 \text{ km} = 45 \text{ km}$$

$$a_x = \emptyset$$

$$b_x = (15 \text{ km}) \cos(28^\circ) = 13.24 \text{ km}$$

$$+ c_x = (20 \text{ km}) \cos(79^\circ) = 3.82 \text{ km}$$

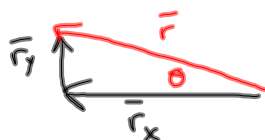
$$\underline{r_x = 17.06 \text{ km}}$$

$$a_y = 10 \text{ km}$$

$$b_y = (15 \text{ km}) \sin(28^\circ) = 7.04 \text{ km}$$

$$+ c_y = -(20 \text{ km}) \sin(79^\circ) = -19.63 \text{ km}$$

$$\underline{r_y = -2.57 \text{ km}}$$



$$r^2 = r_x^2 + r_y^2$$

$$r = 17.26 \text{ km}$$

$$\tan \theta = \frac{r_y}{r_x}$$

$$\theta = \tan^{-1}\left(\frac{r_y}{r_x}\right) = 8.63^\circ$$

$$\vec{r} = 17.26 \text{ km} @ 8.63^\circ \text{ N of W}$$